HE PARAMOTORES

Workshop, Installation Instructions and Operator's Manual

For:

R 220 Engine

Version Edition: V01

For information ONLY.
Without commitment to advise modifications

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Preface

All data and procedures are based on the state of knowledge at the time of publication and the manual has been drawn up to the best of our knowledge, however excluding any liability.

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Introduction

Congratulations on choosing the R220 engine.

The HE Paramotores engine type R220 has been developed exclusively for use in paramotoring, which must only be run mounted with specific propellers, using adequate oil type and fuel. You should also comply with all the flying rules in your country.

Warning: Before starting with installation and operation of the engine, observe the installation instructions and Operator's manual and follow all instructions.

Warning: This engine performs better as comparable products.

Repeating symbols

Warning: Identifies an instruction, which if not allowed may cause injury or endanger the life of the pilot, mechanic or third party.

Attention: Denotes an instruction which if not followed may severely damage the engine. Non-compliance might lead under certain conditions to health hazards.

Note: information useful for better execution and understanding of instructions.

⇨ Denotes a working operation

✓ Denotes a checking operation

1. Installation instructions for HE Engine Type R220

a. General precaution and safety information for engine installation

Warning: For the best possible engine operation, compliance with the following advice regarding installation of engine and equipment is required.

Warning: Modifications on engine or equipment are not allowed.

Warning: Besides the engine–specific installation advice, also take note of information from the respective chassis manufacturer.

b. Engine removal from the crate

All packing material should be disposed of accordingly.

The engine carton contains the following parts:

Qty.	Description	Application
1	HE Motor R220	
1	Workshop, Installation Instructions and Operator's Manual	
1	Engine identity card	
1	Air filter Righetti Ridolfi	-
1	Spark plug	Summer and winter spark plug
1	Exhaust system	
1	Walbro Carburettor	
4	Mounting sets	
2	HE stickers	
	Subject to change	

Attention: If engine is placed on a horizontal surface, take care not to damage the electrical wiring of the starter mechanism.

Note: An engine identity card stating date of delivery, company's name and motor's identification number.

Note: The data entered in the engine identity card is required for verification of a warranty claim. Without a completely filled in identity card no warranty claim will be granted.

c. Engine assembly

If the frame of the chassis was specially prepared to receive the HE Paramotores R220 engine, then 2 steel plats with two holes each are welded on the two frame tubes. The engine is tightened into position with four 8mm bolts and four lock nuts.

You can install the engine on the frame by using 4 rubber mounts of 40 mm between the back flange and the engine mount. This device will permit to evenly distribute the vibrations of the engine on every part of the frame.

For the connection between the carburettor and the fuel tank use a proper hose of the right diameter (1,2 times the max. expenditure per hour, that means sending 11 Litres/hour). The length of the fuel line must not be more than 80 cm.

It is advisable to install a manual primer bulb to get the fuel to the carburettor before for starting. This device will allow the fuel to arrive to the carburettor, protecting in this way the battery.
IMPORTANT NOTES
DO NOT try to start the engine without the propeller.
DO NOT start the engine with loose bolts or parts, since this can cause the detaching of the propeller, the ovalization of the propeller boles and the breakage of the rubber mounts.
IMPORTANT! BEFORE FLYING CHECK ALWAYS EVERY PART OF YOUR CRAFT, FROM ENGINE TO FRAME.
Verify that there are no damaged electric wires, that there are no leaks from hoses, tank, carburettor or engine's crankcase, that the propeller is not damaged or loose, that the exhaust-pipe has no cracks, that the frame is not bent or broken because of falls, that rubber mounts are not cracked, that the reduction belt is not loose and every bolt is tight. Finally you can start the engine, leaving it to warm up at a speed of 2.200 to 2.700 rpm with head temperature at least 120 °C.

During installation, some safety precautions must be made (we remind you that an engine's vibrations, even if very small, can cause the loosening and/or removal of screws or other objects). It is therefore necessary, to avoid any engine components, following accidental detachment, causing damage to people and/or things, to fasten them to the engine using a small steel cable. The components that must normally be "made safe" are:
- The filter and the carburettor, fastened to the engine
- The engine itself, fastened to the frame, bypassing the silent block (in this case use synthetic fibre "straps" that are particularly resistant to traction and tearing).

The spherical mouth of the exhaust pipe must be lubricated with grease that is resistant to high temperatures (e.g. copper grease), before being inserted into the exhaust induction.

We recommend taking maximum care when carrying out these operations. In any case, during the assembly phase the proper choices must be made by expert and qualified personnel.

d. Fitting of the spark plug

⇨ With the engine a spark plug of the type NGK BR 10 EG (summer) or NGK BR 9 EG (winter) get supplied.

✓ Verify electrode gap of spark plug. Adjust as required.

◈ **Note:** The electrode gap of spark plug should be 0,5 mm/0,020 in to 0,6 mm/0,024 in.

Only slight bending of the ground electrode is permitted.

⇨ Fit supplied spark plug and tighten to 24 Nm/212in.lb.

⇨ Put spark plug cap or connector on spark plug.

e. Installation and connection of the carburettor

⇨ Check that all the gaskets are properly fitted onto the laminar entry box and carburettor installation plat.

⇨ Remove the transport plug from the carburettor.
⇨ Fit carburettor into carburettor socket and secure with hose clamp in vertical position.
⇨ The R220, connect the outlet hose of the fuel pump with fuel inlet on carburettor

◈ **Note:** each time this operation is conducted make sure to use a new set of gaskets.

f. Installation of the Righetti Ridolfi Air Filter / silencer

⇨ Fit the carburettor socket **1** into the Air filter hole.
⇨ Attach the intake silencer with the supplied hose clamp **2** on the carburettor.

◈ **Note:** the carburettor socket is asymmetrical and can be turned so that the best possible position for maximum leg clearance can be achieved.

g. Observation of the engine speed.

To determine the best possible transmission ratio, the use of a rev-counter is required for observation of the speed limits.

◈ **Note:** HE Paramotores offers as an accessory the following indicating instrument: Tiny-Tach inductive rev counter.

◈ **Note:** This instrument is operating via an integrated battery. At engine start the readings of the connected sensors (inductive pick-up for engine speed (r.p.m.) will be displayed). This display will remain on for 5 seconds after engine stop.

■ **Attention:** Pay attention to the manufacturer's notes about connections and operation of the instrument.

■ **Attention:** Use the original spark plug of 5 k resistance, so that the operation of the rev counter is not impaired.

Wind at least three turns of the inductive cable between the ignition coil and spark plug connector and secure it with a cable tie on the ignition cable.

Attach the instrument with cable ties for highest visibility and lowest inconvenience on the harness or chassis.

■ **Attention:** Use a vibration damping pad between the instrument and tightening spot.

⇨ Secure induction cable with cable ties on the frame.

■ **Attention:** The induction cable must be free of tensile stress; stress could damage the cable or could result in the malfunctioning of the cable and the instrument.

⓪ **Warning:** Before engine operation, read the Operator's Manual.

MAIN TORQUES and settings

Description	Kg.m	(Nm)
DECOMPRESSOR	2,0	20
NUTS TO FIX THE HEAD	2,2	22
NUTS TO FIX HALF-CRANKCASE	2,5	25
BOLTS TO FIX THE BACK FLANGE TO THE CRANKCASE	2,0	20
NUTS TO FIX THE PISTON TO THE FRONT PART OF THE DRIVE SHAFT	4,5	45
NUTS TO FIX BACK PART OF ORIVE SHAFT TO IGNITION HANDWHEEL (manual version)	3,5	35
6x40 Screws	1,2	12
Connector	1,0	10
Spark plug	1,8	18

2. Operating instructions for HE engines type R220

a. Technical description of the HE engines type R220

i. Type of engine

Single cylinder two cycle engine with reed valve controlled inlet. Mixture lubrication is achieved by adding oil to the gasoline in a specified mixing ratio.

ii. Ignition unit

Easy manual start system with internal decompressor: placed for over shoulder start.

iii. Carburettor

Walbro WB37 (report to the Walbro user manual for any specific information).
Report to engine tuning section for tuning details.

iv. Intake silencer

The intake silencer incorporates an air filter to clean the intake air. The intake silencer has been designed for optimum reduction of the air intake noise level and represents a tuned system with the engine.

v. The exhaust system

The exhaust system is designed as resonance system with an after muffler and represents a tuned system with engine.

b. Fuel as media for engine operation

The R220 engine is designed to function with a GASOLINE/OIL mixture.

Use for the mixture only premium fuel for cars 95 octane, together with good- quality, synthetic oil for mixtures at a quantity of 2,2% .(DO NOT USE MIXTURE ALREADY DONE AT PETROL PUMPS). IMPORTANT: with very hot climate and high temperatures use PERCENTAGE 2.2%.
When you prepare the mixture, make sure that the can has not dirt or water in it, put always the oil first and mix thoroughly.
Never run the engine without the air-filter, because dirt and dust raised by the propeller can damage it.

Amount of oil for a given amount of petrol:

	R220
Before 6 hours (Two 9L full tanks)	2,5 % of the amount of unleaded petrol (U.P.) 95 with fully synthetic 2 stroke oil (e.g. CASTROL TTS).
After 6 hours	2,2 % of the amount of U.P. 95 with fully synthetic 2 stroke oil.

⇨ Pour small amount of fully synthetic 2 stroke oil in a clean fuel container.
⇨ Add amount of unleaded petrol 95 to obtain a good mixture.

■ **Attention:** Too much oil in the fuel mixture could lead to engine trouble (e.g. cooking of the exhaust valve).

■ **Attention:** Insufficient amount of oil in the fuel mixture could result in engine trouble (e.g. piston seizure).

◑ **Warning:** Do not try any different sorts of fuel. This could lead to engine damage to the intake system.

◑ **Warning:** When mixing fuel and fuelling do not smoke or allow naked flames. Petrol is highly flammable and explosive under certain conditions.

◑ **Warning:** Never perform mixing and fuelling in a closed room, handle fuel in well-ventilated area only.

◈ **Note:** Do not fill the fuel container to the top.

⇨ Shake well fuel container.
⇨ Pour fuel into fuel tank of the paramotor,
⇨ Close fuel tank and fuel container immediately after fuelling.

◑ **Warning:** Before each fuelling, shake well fuel container to ensure adequate mixing of the gasoline with the oil.

◑ **Warning:** Fuel the paramotor only when engine is not running.

◑ **Warning:** Make sure that the fuel will not splash onto hot engine components or equipment. Risk of fire and explosion!

◑ **Warning:** Pay attention to the safety advice of the paramotor manufacturer!

■ **Attention:** Don't spill fuel. Absorb spilled fuel with appropriate drying agent and ensure ecological disposal.

■ **Attention:** Ensure that no contamination enters the fuel tank and the carburettor.

■ **Attention:** Unleaded fuel has a limited storage life. Store only the quantity of fuel in a container which will be needed in the near future.
■ **Attention:** Do not use vegetable or animal oil.
■ **Attention:** DO NOT MIX DIFFERENT TYPES OF OIL TOGETHER.

c. Engine tuning

i. Carburettor

Warning: It is recommended to carry out the carburetion operations with the ENGINE SWITCHED OFF!

The engine is carburetted in the factory before delivering; do not try to modify the carburetion if you do not know how.

A "full rich mixture" produces more vibrations and increases consumption.

With a "lean mixture" the engine is more even but it gets overheated (usually there are "blanks" in the carburetion). After 10 minutes of working, the spark plug will start to get dirty with fuel waste. Ideal mixture is reached when the insulator of the spark plug is coffee brown; if the colour is black, the mixture is too rich, therefore turn screw H clockwise 1/8 round per time. If the spark plug is grey/white, the mixture is lean, therefore turn screw H and L counter clockwise always 1/8 round per a time. Remember that if the mixture is too lean, THE Piston CAN SEIZE. You can see better the colour of the spark plug by keeping the engine for 20 seconds at maximum speed and switching it off suddenly without letting it slow down.

spark plug colour	yellow/grey	hazel brown/light brown	brown/black
carburetion	lean	right	rich

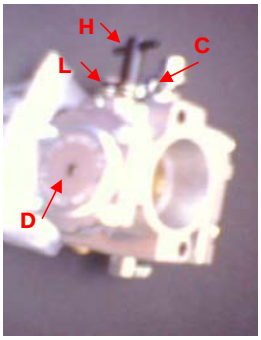
Diaphragm carburettor

In order to work properly, the diaphragms (pump and valves) must be kept wet by the fuel mixture, after a long resting without fuel or after several working hours the diaphragms may need to be replaced. In case of doubts please do get in touch with us. The replacement may be necessary every year, the use of old diaphragms leads to an increasing leaning of the mixture and piston seizure. In some cases it may be necessary a seasonal carburetion setting, especially if you change of altitude, for such a setting please do turn to an expert.

idle too lean :	Difficult start, while revving up the engine tends to stop
idle too rich :	The engine abates while leaving it at idle for ten sec. and it revs up slowly, excess of smoke.

The Walbro WB37 carburettor, if used correctly, provides excellent performance, requiring few tuning interventions. In any case, changes in climatic and height conditions can affect functioning. The carburettor is adjusted during the testing phase with a standard setting:

The little hole **D** at the front of the carburettor is used in the priming process before starting a cold engine (Push cautiously! Go to section 2. e.).



At high revs, you can set the carburetion at the desired R.P.M. By turning the long black screw **H** anticlockwise, you rich the mixture, while the opposite you lean it. **The basic setting is between one and half turn from the shut position**. The **H** screw must be turned very gently. According to the environment in which you are going to fly, the A screw can be opened or closed from the recommended position a quarter of a turn (by the sea side, closed a quarter down, in the mountain, opened a quarter up)

At low revs, you can set the carburetion at the desired R.P.M. By turning the small black screw **L** anticlockwise, you rich the mixture, while the opposite you lean it. **The basic setting is half a turn from the shut position**. The **L** screw must be turned very gently.

The **C** screw sets the revs at idle, by opening the butterfly valve (for additional information please contact your local distributor). If the idle is high, turn the screw in an anti clockwise direction. If the idle is low, turn the screw in a clockwise direction.

Bearing in mind the fact that the first testing is carried out at a height of 750 m above sea level, it may be necessary to change from this setting, without exceeding the limit regulations: Screw H - do not go below one turn or "360°". Screw L - do not go below *1/2* turn or “180°

The carburettor is provided with a depression pump to remove the fuel from the tank. The gap between the two must not exceed 50-60cm. The same applies to the tube, which must not exceed 50-60cm.
It is advisable to insert a manual pump between the tank and the carburettor, so that the mixture can reach the carburettor before start-up, therefore avoiding stressing the starter motor.

Furthermore, we advise to put a small security-cable on the air filter, on the muffler, to avoid that it can come off. These adjustments can be different on the basis of weather conditions and flight altitudes. Once you have found the perfect mixture do not change it unless you change flight place or climate conditions, since register screws can be damaged by continuous adjustments.

ii. TENSION OF THE REDUCTION BELT DRIVE

USE CAUTION Attention: a belt which is "over tensioned" can do permanent damage to the bearings inside of the pulley hubs and drive shaft. Therefore we strongly suggest for you to follow carefully these instructions.
Before adjusting the belt take a felt pen or marker and make a small sign on the cam shaft and on the front of the reduction plate. This is your Zero or start point and from here you will be able to clearly see how much you move the eccentric tensioning cam in relation to the reduction plate. Remember "these are Fine adjustments" and we suggest not rotating the cam any more than 1 mm per adjustment. After each adjustment you can try to start the engine and check the result. If the engine does not start well then it usually means the belt is still too loose and is slipping - in this case repeat the operation by tensioning the belt another 1 mm. Consider that if the belt slips a little, but the engine still starts fine, then the tension is correct. Belt tension always unreleased automatically when the engine is running because of thermal expansion in the pulleys. Once you have found the correct tension, do not adjust it any more. In case of doubts please contact your paramotor dealer - or HE Paramotores.

iii. Propeller

Ref. HE	Name	Description	Quant./ unit
	Propeller Carb for R220	H30F 1,25m L-M 07 - 02	x1
HEL0003	Propeller for R220 Wood	48x24 L	x1

Only the propellers listed in the above table have been properly tested and are adapted to our motors.

■ **Attention:** Never run your engine without an adequate propeller fitted! You may damage your engine.

⓫ **Warning:** Take care whilst operating your engine with prop on!!! Never operate an engine with prop if not properly fitted onto an adapted chassis and without a frame securing you from the propeller.

⓫ **Warning:** Do not operate engine with propeller if you have not followed a certified paramotoring course and are not qualified to handle these machines.

⓫ **Warning:** HE Paramotores does not take any responsibility for bad handling and dangerous behaviours with its engines.

■ **Attention: HE engines type R220 have been developed only for paramotoring purposes. Any other use will not be covered by the engine's guarantee.**

To attach the propeller use only bolts of class 10/8 (100 Kg) and make sure that their length is enough to exit from the reductor-pulley. Tighten the 6 bolts M8 in a cross, at 1.5 Kg.m. (15Nm). Re-check the torque of the bolts after the first hour of engine's working.
We suggest not using a variable pitch carbon prop. because the big hub pushes the prop too forward, with possible damages to pulley and bearings.

iv. Characteristics and Operating limits R 220

Cycle	2 strokes
Total displacement	218 c.c.
Bore	65 mm.
Stroke	52 mm.
Compression ratio	10:1
Peak rpm	7.480 rpm
Cooling	by air
Piston	of light alloy with 2 piston ring of cast iron S10 chrominium-plated
Cylinder	Nikasil Coated lining
Head	die-casted light alloy with high percentage of silicon
Crankcase	CNced Hard aluminium
Connecting rod	of steel 18 Ni Cr Mo 5 forged and Copper-plated with rolls fit for high speed
Carburettor	Diaphragm – Walbro WB37
Feeding	reed valve with 4 petals on the crankcase
Regulation of spark advance	15° with electronic ajustment
Spark plug	NGK B9ES
Reduction	with belt Poly-V 1 to 2.6
Cylinder head temperature	max 170°C
Fuel	mixture of premium petrol 98 or 95 octane unleaded and oil at 2%
Oil	synthetic top-quality oil for 2-strokes engines
Expenditure	from 2,5 to 7,5 litre/hour depending from the load and the speed
Fixing to the frame	4 rubber anti-vibration mounts
Rotation	anticlockwise in front of the propeller

◑ **Warning:** The engine is only allowed to be run at peak performance after reaching the specified the specified operating temperature of 160 °C.
◑ **Warning:** The maximum operating temperature of the engine must not be exceeded. If the temperature is too high (above 240°C), it may result in piston seizure.
◈ **Note:** Dirt must be cleared at regular intervals to achieve the best cooling performance.
■ **Attention: Keep your engine clean at all time!!!**

d. Engine start and operation

Prior to engine start verify the following:

✓ **Before starting the engine, ALWAYS check that the throttle cable is not jammed open! Do this by squeezing the throttle lever and allow it to release sharply. Look around and make sure there is no one nearby and SHOUT "Clear prop!" to warn others of your intentions.**

⓵ **Warning:** Never start the engine without the propeller!! A two-stroke engine has a low mass and its maximum speed is reached in fractions of a second when no load is applied. It is not equipped with a rev limiter and the mechanical parts are only designed to work at the rotation speeds reached with the propeller. Exceeding this speed will have catastrophic effects on the engine.

✓ Fuel tank full,

STARTING A COLD ENGINE

If the engine is being started for the first time, or it has run out of fuel you will need to prime the fuel system. Gently press the short, fitted wire prod through the hole in the centre of the plate on the propeller side of the carburettor whilst simultaneously squeezing the pump bulb. This allows you to push fuel through the fuel filter and into the carburettor. Squeeze the bulb just once and watch the fuel pass through the clear filter. Stop, pull the wire prod back and gently squeeze the bulb again. The carburettor is primed. When starting a cold engine pull the choke wire towards you, then start the engine and wait until it stops running. Then return the choke wire to the neutral position and start the engine again using a little throttle then let it tick over until warm. The engine will normally start without any problems unless
the outdoor temperature is very low. In this case repeat the use of the choke.

◈ **Note:** To avoid damaging the starter mechanism, always use the starter as follows: hold the starter handle with one hand, brace yourself against the frame with the other and gently pull the starter feeling for the point of maximum resistance. Once there, give the starter cord a short sharp pull. Normally the engine will start up immediately. If the engine does not start, don't keep pulling the starter, it will not help and it could even be dangerous. Save your energy and find the source of the problem. It is nearly always an excess of fuel – the engine has been flooded. Over zealous use of the fuel primer pump will flood it and it won't start no matter how many times you pull the chord (!) If the engine has become flooded, simply remove and wipe clean the spark plug. Tip: use a cigarette lighter to burn off the excess fuel on the spark plug

STARTING A WARM ENGINE

Follow the same procedure as before but do not use the choke.
The engine needs to reach its working temperature – allow it to warm up for at least a minute before revving it.

e. Stopping the engine

Press the Kill switch button for more then 3 seconds.

⓵ **Warning:** If not, you engine will restart.

f. Running in procedure for the engine

All HE engines, before being delivered, are subject to a severe quality-check, in order to verify if all the components respect the fixed parameters, but a further running-in is anyway necessary. A GOOD RUNNING-IN WILL PROLONG THE LIFE OF YOUR ENGINE.

Go to a quiet place, put a thick rubber carpet under your craft to avoid that stones or other things damage the propeller by putting it on earth and let the engine work at a speed of 2500 rpm for 5 minutes, and then regulate speed at 3000/3500 rpm for 15 minutes, then at 4000 rpm for other 15 minutes. Switch off the engine and check that there are no loose nuts or bolts and that every component is ok. BE CAREFUL NOT TO TOUCH HOT PARTS (POWER UNIT AND EXHAUST PIPE). Start the engine again and take it step by step to 4000 rpm for 5 minutes, then accelerate to 4500 rpm for 15 minutes. During the first 10 hours, do not subject the engine to extreme efforts and speed. Also during normal use excessive loads (ex. tandems with passenger) can force the engine with possible damages to the engine itself. ALWAYS CHECK at sight your craft before and after every flight, for loose parts or damage. After each flight, clean the head from possible oil residues. During the run-in period vary the power often for a proper piston ring setting.

It is possible that the engine may overheat during the running in period. If this happens you'll notice a loss of thrust and you should switch the engine off and let it cool down, or at least, immediately reduce the revs. An overheated engine can usually be detected by back firing noises or by oil stains on the cylinder cooling fins. If the engine should overheat the bolts on the cylinder head may become slack and should be checked – do not over tighten them! Don't mistake overheating for poor carburettor adjustment or dirt in the filter both of which may also cause a loss of thrust.

⓪ **Warning:** Always wear appropriate clothing to operate your paramotor (Helmet, gloves, proper shoes…).

⓪ **Warning:** Do not touch the engine, the exhaust system during and immediately after motor operation. Risk of burning!

⓪ **Warning:** During operation beware of body or clothing contact with propeller or engine!!!

⓪ **Warning:** Comply with the safety advice of the paramotor manufacturer.

⓪ **Warning:** Inspect any part prone to wear before and after each flight in accordance with the directive of the paramotor manufacturer.

⓪ **Warning:** Keep the running-in procedure as directed.

⓪ **Warning:** operate engine only in the specified limits.

⓪ **Warning:** Never engine with an empty fuel tank.

◈ **Note:** To start with do not operate your engine for longer periods then stated above.

◈ **Note:** You must run-in the engine before flying.

◈ **Note:** Do not rev. up for five minutes while running-in.

◈ **Note:** The lifespan of your engine can double with a proper running-in, while with a bad one you may damage it since the very first hours of working.

◈ **Note:** In the first phase of the running-in the engine must be switched on and off following the cycles below:

engine	1° cycle	2° cycle	next
on off	2 minutes 2 minutes	5 minutes 5 minutes	10 minutes 5 minutes.

◈ **Note:** While on, the engine must be gently set at different revs, starting from the lowest up to the highest.

ⓘ **Warning: Repeated revving are unsuitable**, the clutch may be surcharged.

After each switching off, do carefully check all the mechanic parts, bolts and knots.

After at least 30 minutes of work you can fly avoiding high revolutions for too a long time.

A heavy pilot requests more power to fly, in such a case is better to run the engine on the ground for at least 1 hour.

After the first 30 minutes of run, do check all the bolts, knots and screws, particularly those of the engine and the prop as well. Those of the engine (bolts and knots) must be checked every 5 hours of flight.

Engine overheating may occur while running-in; you can recognize it by a loss of power.

In this case is very dangerous to keep it on, it is better shutting off and let cooling, OR, AT LEAST SLOW DOWN BELOW 5000 RPM before applying more power. A loss of power may occur because a mixture too lean, following a wrong carburettor setting or dirty in the filter, do check for such possibilities before restarting the engine

In case of overheating it is advisable to check the head screws to verify the seal of the motor head, see locking torques. Usually a loss of seal can be perceived by dull strokes at starting or by oil leakage, once the air conveyer is removed.

g. Maintenance

ⓘ **Warning: Change lock nuts for new ones if untightened!**

MAINTENANCE - BEFORE EVERY FLIGHT IT IS IMPORTANT THAT YOU;

✓ Check that the propeller is not damaged, that it is secure and that it turns smoothly without making noises. BE CAREFUL - never be tempted to put your hands in the paramotor once the engine is started even though the propeller is not moving.

✓ Check that the exhaust pipe is correctly held in place and that it is not damaged; check that all of the engine parts, air filter and carburettor, petrol tank and pipe, spark plug and starter cable are fitted correctly and are secure. Check that nothing can come loose in flight because if anything hits the propeller it will be a danger for the paramotor, the pilot and other people.

✓ Check the welding on the chassis, especially where the engine is located. Check that the netting is securely held in place. Check that none of the paraglider lines are in the way of the propeller and that nothing else can be sucked in.

■ **Attention: If in doubt, do not take off!**

When you have landed, use a clean cloth to remove traces of oil and dust from the engine and the propeller. This is the best way to discover any potential problems.

- Every 20 hours:
Check the condition and gap (0.7 mm) of the spark plug
Clean the air-filter, the carburettor filter placed at the end of the fuel pipe and the filter of the fuel tank
Check the torque of every bolt
Tighten head nuts (in cross order) with a Torque Wrench at 2.2 Kg.m (22Nm)
Check the tension and condition of the reduction belt
Check fuel lines
Check the wiring
Check that the cord of the starter has no abrasions
Grease the link-sphere between the manifold and the exhaust pipe with lubricating copper-grease suitable for high temperature (up to 1100°). If you can't find it on the market, please ask to your dealer.
- Every 50 hours
Same controls of the 20 hours and furthermore:
Check the torque of the engine's crankcase nuts
Change spark plugs
Change the petals of the reed valve
Check the reduction belt and the play of the pulley and change them in case of need
Once a year (independently from flight hours) change the diaphragm of the Carburettor.
N.B. It is advisable to keep records of all maintenance in a log book for the engine. It is also advisable to install an instrument (CHT) to control the head temperature at sight.

We recommend that engines with more than 200 working hours should be factory overhauled in order to replace any possibly deteriorated parts.

h. Preservation of engine and equipment

For long periods out of operation (winter time), make sure that the engine will be properly preserved.

⇨ Detach carburettor, drain fuel from fuel system and close carburettor openings to ensure that no dust or dirt can enter.

⇨ Close intake and exhaust port of engine so that they are air tight with adhesive tape.

⇨ Apply oil on exhaust systems to prevent corrosion.

In case the engine is not used for a long time, act like this:

⇨ Empty the fuel tank, included the fuel lines and the carburettor

⇨ Unscrew the spark plug and pour into the hole a teaspoon of oil for engines, then re-install the spark plug letting the propeller turn slowly by hand for 2 or 3 times completely.

⇨ Disassemble the propeller

⇨ Loosen the reduction belt

⇨ Plug the hole of the exhaust pipe

⇨ Cover everything with a blanket and put it in a dry place

⇨ Once a month, let the pinion of the drive shaft turn by hand 2 or 3 times completely.

i. Trouble shooting

THE ENGINE DOES NOT START Check:

- Switch on-off
- Cable of the spark plug
- Correct spark plug gap
- All the connections of the electric plant
- That fuel arrives correctly from the tank to the carburettor

FLOODED ENGINE

Dismantle the spark plug and dry it well; before re-assembling it, let the propeller turn slowly 2/3 times.

THE ENGINE DOES NOT HOLDIDLE SPEED OR HAS AN IRREGULAR SPEED

Clean and adjust the carburettor. Check the reed valve petals are closing completely. Hold the reed up to a light and you should not see any light past the petal seating area.

THE ENGINE CANNOT REACH MÁXIMUM SPEED

Check cable pulling throttle fully open.

Check that there is neither dirt in the carburettor or tank-filter nor restrictions in the fuel pipe, due to too tight curves, or air bubbles.

Check the spark plug; is it's worn, change it with one of the same brand and same heat range.

In case the head is dismantled to be decarboned, change both the head gasket and the cylinder gasket.

THE DECOMPRESSOR REMAINS BLOCKED

Detach the gum tube on the decompressor and inject inside 1 or 2 drops of detergent. Detach the spark plug cap and let the prop turn. If this is not enough, disassemble the decompressor with a tube wrench of 15, modified in the external diameter with a lathe. Remove encrustments from the decompressor and by reassembling it, tighten it at 2 Kg/M or 20 Nm with a dynamometric wrench.

SOME FINAL IMPORTANT ADVICE

NEVER switch on the engine with people near propeller, or to sides. The BREAKAGE of a propeller can cause very severe hurts even several metres away. DO NOT keep engine at peak rpm after the take off, except for the absolutely necessary time and for emergencies (obstacles or sudden wind). If you use big propellers, REMEMBER that cooling is not perfect flying at high speed, so keep under control the temperature of the engine with proper Instruments (CHT). In addition, dismantle the propeller at regular intervals and check that it is perfectly balanced, since an unbalanced propeller, even slightly, creates micro-vibrations which are not felt by the pilot, but can damage seriously parts of the engine with consequent breakages. Please do NOT forget that the propeller has mass and a considerable inertial movement, so it's advisable not to vary suddenly the RPM of the engine, both in flight and on the ground. These sharp and violent stresses could cause damages to the reduction, to the engine, to the belt and also possible deformations to the fixing boles of the propeller. Once you have found the perfect carburetion, DO NOT modify it unless you change flying place going to much higher or lower altitudes or unless climate and temperature are very different from the ones where you fly usually. DO NOT FLY in bad weather conditions, you'll fly the day after. REMEMBER: FLIGHT IS FOR FUN, NOT FOR RISKING YOUR LIFE! HAVE A GOOD FLIGHT AND ENJOY YOURSELF.

3. Warranty

a. Warranty conditions / Warranty card

i. Period

HE Paramotores as manufacturer, warrants directly or through their authorized HE Paramotores distributors from the date of sale to the first consumer, every HE Paramotores R220 engine, sold as new and unused, and delivered by an authorised HE Paramotores distributor for a period of the earliest of:

◈ **Note:** 6 consecutive months for private use owners;

◈ **Note:** or 12 consecutive months for engines bought through our distributors' network.

ii. What an authorized HE Paramotores distributor will do

The authorized HE Paramotores distributor will, at its option, repair and / or replace components defective in material and/or workmanship under normal use and service, with a genuine HE Paramotores component without charge for parts or labour, during said warranty period. All parts replaced under warranty become the property of HE Paramotores.

iii. Condition to have the warranty work performed

You must present the authorized HE Paramotores service-centre, the hard copy of the HE Paramotores warranty registration card and/or proof of purchase delivered to the customer from the selling dealer at the time of the purchase.

iv. Exclusions – are not warranted

◈ **Note:** Normal wear on all items

◈ **Note:** Replacement parts and/or accessories which are not genuine HE Paramotores parts and/or accessories.

◈ **Note:** Damage resulting from the installation of parts other then genuine HE Paramotores parts.

◈ **Note:** Damage caused by failure to provide proper maintenance as detailed in the operator's manual. The labour, parts and lubricants costs of all maintenance services, including tune-ups and adjustments will be charged to the owner.

◈ **Note:** Paramotor engines used for racing or commercial purposes.

◈ **Note:** All optional accessories installed on the paramotor engine (the normal warranty policy for parts and accessories, if any, applies).

◈ **Note:** Damage resulting from running the paramotor engine without a propeller.

◈ **Note:** Damage resulting from modification of the paramotor engine not approved in writing by HE Paramotores.

◈ **Note:** Damage caused by electrolysis.

◈ **Note:** Cold seizure and scuffing.

◈ **Note:** Use of gear reduction not designed by HE Paramotores.

◈ **Note:** Use of propeller not referenced by HE Paramotores.

◈ **Note:** Losses incurred by the paramotor engine owner other then the parts and labour, such as, but not limited to, mounting and dismounting of the engine from the paramotor, loss of use, transportation, telephone calls, taxis and any other incidental or consequential damage.

◈ **Note:** Damage resulting from accident, fire or other casualty, misuse, abuse or neglect.

◈ **Note:** Damage/rust/corrosion/premature wear to the engine caused by water ingestion.

◈ **Note:** Damage resulting from sand/stones infiltration.

◈ **Note:** Damage resulting from any foreign material ingestion.

◈ **Note:** Damage resulting from service by an unqualified mechanic.

v. Expressed or implied warranties

This warranty gives you specific rights, and you may also have other legal rights which may vary from state to state, or province to province. Where applicable this warranty is expressly in lieu of all other expressed or implied warranties of HE Paramotores, its distributors and selling distributors, including any warranty of merchantability or fitness for any particular purpose; otherwise the implied warranty is limited to the duration of this warranty. However some states or provinces do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply.

Neither the distributor, nor any other person has been authorised to make any affirmation, representation or warranty other than those contained in this warranty, and if made, such affirmation, representation or warranty shall not be enforceable against HE Paramotores or by any other person.

HE Paramotores reserves the right to modify its warranty policy at any time, being understood that such modification will not alter the warranty conditions applicable to paramotor engines sold while the above warranty is in effect.

vi. Consumer assistance procedure

If a problem or other difficulty occurs, please contact:

◈ **Note:** Authorized HE Paramotors service centre or,

◈ **Note:** Authorized HE Paramotors distributor.

vii. Validity

Warranty will only be valid if the end-user completes this registration card as soon as the paramotor engine goes into service, and returns it to the authorized HE Paramotor distributor (see in our Internet site Distributor network) of the area in which the paramotor engine is firstly operated.

viii. Warning!

ⓘ **Warning:** This engine by its design is subject to sudden stoppage! Engine stoppage can result in crash landings. Such crash landings can lead to serious bodily injury or death.

Never fly the paramotor equipped with this engine at locations, airspeeds, altitudes, or other circumstances from which a successful no-power landing cannot be made, after sudden engine stoppage.

Paramotors equipped with this engine should only fly in daylight VFR conditions.

ⓘ **Warning:** This is not a certified paramotor engine. It has not received any safety or durability testing, and conforms to no aircraft standards. It is for use in experimental, uncertified paramotors and vehicles only in which an engine failure will not compromise safety.

User assumes all risks of use. And acknowledges by this use that he knows this engine is subject to sudden stoppage.

Warranty Registration Card

1. To be eligible for warranty, this registration card must be returned completed and signed by the end user to the authorized HE Paramotors distribution partner (section 3.a.vii) of the area of the permanent residence of the end user and/or in which the paramotor engine is firstly operated, within 30 days as of date of purchase.

2. No other warranties and / or guarantees than defined in the actual warranty conditions are made.

3. Engine type: ……..

Engine no: ……

Gearbox: …… Reduction 1 - ……

Inv. –no: …… Date of purchase: ……

Warranty expires: ……

Seller: ……

Buyer: ……

I have read and understood the operator's manual in its entirety and carefully followed the described break-in procedure.

Date: …… Signature:

Warranty Registration Card

1. To be eligible for warranty, this registration card must be returned completed and signed by the end user to the authorized HE Paramotors distribution partner (section 3.a.vii) of the area of the permanent residence of the end user and/or in which the paramotor engine is firstly operated, within 30 days as of date of purchase.

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Engine no: ……

Gearbox: …… Reduction 1 - ……

Inv.–no: …… Date of purchase: ……

Warranty expires: ……

Seller: ……

Buyer: ……

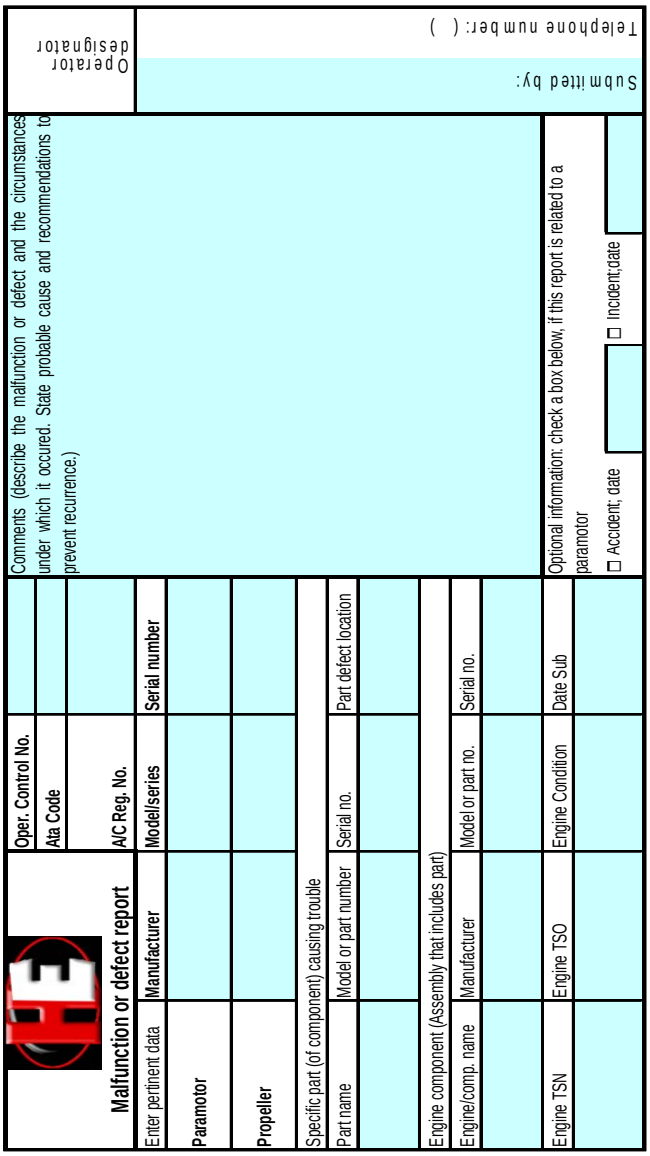
Customer copy Keep for your records

I have read and understood the operator's manual in its entirety and carefully followed the described break-in procedure.

Date: …… Signature:

ix. Reporting

In case of a malfunction or a defect the form below should be filled out and should be sent to the responsible HE Paramotor authorized distributor.



Malfunction or defect report			Oper. Control No.		
			Ata Code		
			A/C Reg. No.		
Enter pertinent data	Manufacturer		Model/series		Serial number
Paramotor					
Propeller					
Specific part (of component) causing trouble					
Part name	Model or part number		Serial no.		Part defect location
Engine component (Assembly that includes part)					
Engine/comp. name	Manufacturer		Model or part no.		Serial no.
Engine TSN	Engine TSO		Engine Condition		Date Sub

Comments (describe the malfunction or defect and the circumstances under which it occured. State probable cause and recommendations to prevent recurrence.)

Optional information: check a box below, if this report is related to a paramotor

☐ Accident; date ☐ Incident;date

Submitted by:

Telephone number: ( )

Operator designator

Notes: